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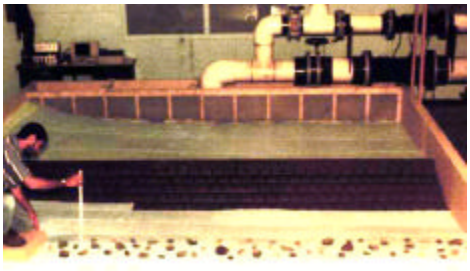
USGS Designs Fishway for Little Falls Dam

A U.S. Geological Survey (USGS) scientist at the S.O. Conte Anadromous Fish Laboratory in Massachusetts has designed a novel fish passage device for Little Falls Dam on the Potomac River. The new design is based on the hydrological and engineering requirements of the dam and the biological needs of migrating fish – especially American shad — that are expected to use the new passageway.

Aerial view of Little Falls Dam on the Potomac River between Maryland and Virginia.

Little Falls Dam is located on the Potomac River, two miles north of Washington, D.C. The 12-foot high dam, built in 1959, blocks the migration of American shad, blueback herring, and other migratory fish from approximately 10 miles of prime feeding and spawning habitat above the dam. Little Falls is a feeder dam used primarily for storing water to supply the Washington Aqueduct.

The U.S. Fish and Wildlife Service (FWS) designed the original fishway for the Little Falls Dam; the vertical slot fishway was located on Snake Island near the middle of the river. The original design was adapted from successful fishways used in the Pacific Northwest for passage of salmon around hydroelectric dams. However, due to the difference in the habits of Pacific salmon and American shad and the location of the fishway in the middle of the river, the device was not used by migratory fish.



USGS scientist works on a 3-dimensional model of the Little Falls Dam fishway.

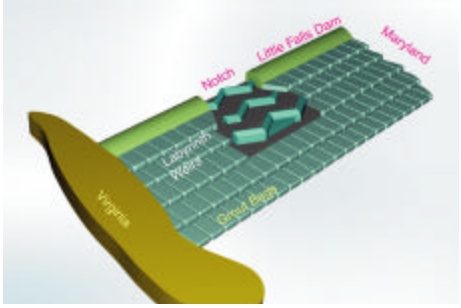
The inability of the fish to traverse the dam may have contributed to the decline of the American shad population in the river. In the 1950s, shad landings from the Potomac were estimated to be in the range of 300,000 fish per year. Today, the estimated shad population size is about 10,000 fish. Due to the decline of American shad, the State of Maryland imposed severe restrictions on shad harvest in the Potomac in 1982 and made passage of anadromous fish at the dam a priority in 1988.

In 1992, FWS organized a task group of interested government agencies and private parties to explore solutions to the fish passage problem. The group discussed and agreed upon a set of design criteria for a fish passage device that took into consideration the engineering and biological requirements of the site. The placement of the fishway had to accommodate the behavior of migrating fish. It had to be engineered so that the water velocity through the passageway would be slow enough for migrating fish to swim through to the upstream side. The structure also had to be relatively inexpensive to install, easy to maintain, and could not compromise the water retention requirements of the dam.

With these requirements in mind, USGS scientists at the S.O. Conte Anadromous Fish Laboratory in Turners Falls, Massachusetts, undertook the job of designing a new fishway. Two scale models of the dam and river system were built. One model was 2-dimensional and the other a 3-dimensional rendering of the physical conditions. The models were used by the scientists to test a variety of fish passageway designs.

The final design includes a notch at the top of the dam and a set of labyrinth weirs within and downstream of the notch. The weirs are critical to the design of the device because they decrease the velocity of water flowing through the passageway, allowing the fish to swim upstream. The resulting water velocity is well below the maximum swimming speed of American shad and may be acceptable for smaller and weaker swimming fish species, as well.

Construction of the fishway is scheduled to begin in the latter part of 1999. Its degree of success will have to be monitored once it becomes operational on the river. A noticeable recovery of the American shad population in the Potomac River and the Chesapeake Bay may be the ultimate indicator of the success and effectiveness of the novel fishway.



Little Falls Dam fish passage device developed by USGS scientists at the research lab in Massachusetts.

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